Center for Education Policy Research

HARVARD UNIVERSITY

Teacher Employment Patterns and Student Results in Charlotte-Mecklenburg Schools

Strategic Data Project

Center for Education Policy Research at Harvard University

February 23, 2010

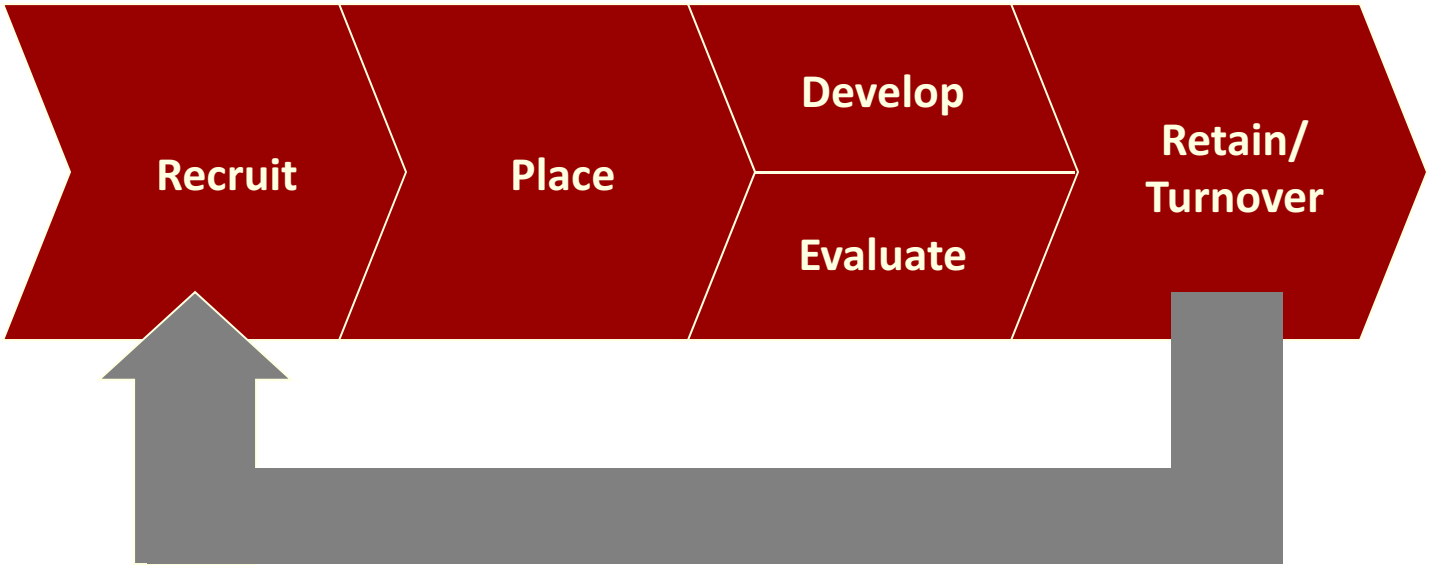
Overview of the Report

This report examines the employment patterns and distribution of teachers to schools and students in the Charlotte-Mecklenburg Schools (CMS) across several years.

We explore the full human capital system for teachers in CMS, including which teachers are recruited, how they are placed in schools and classrooms, how teachers develop and are evaluated over time, and which teachers remain in the classroom and the district.

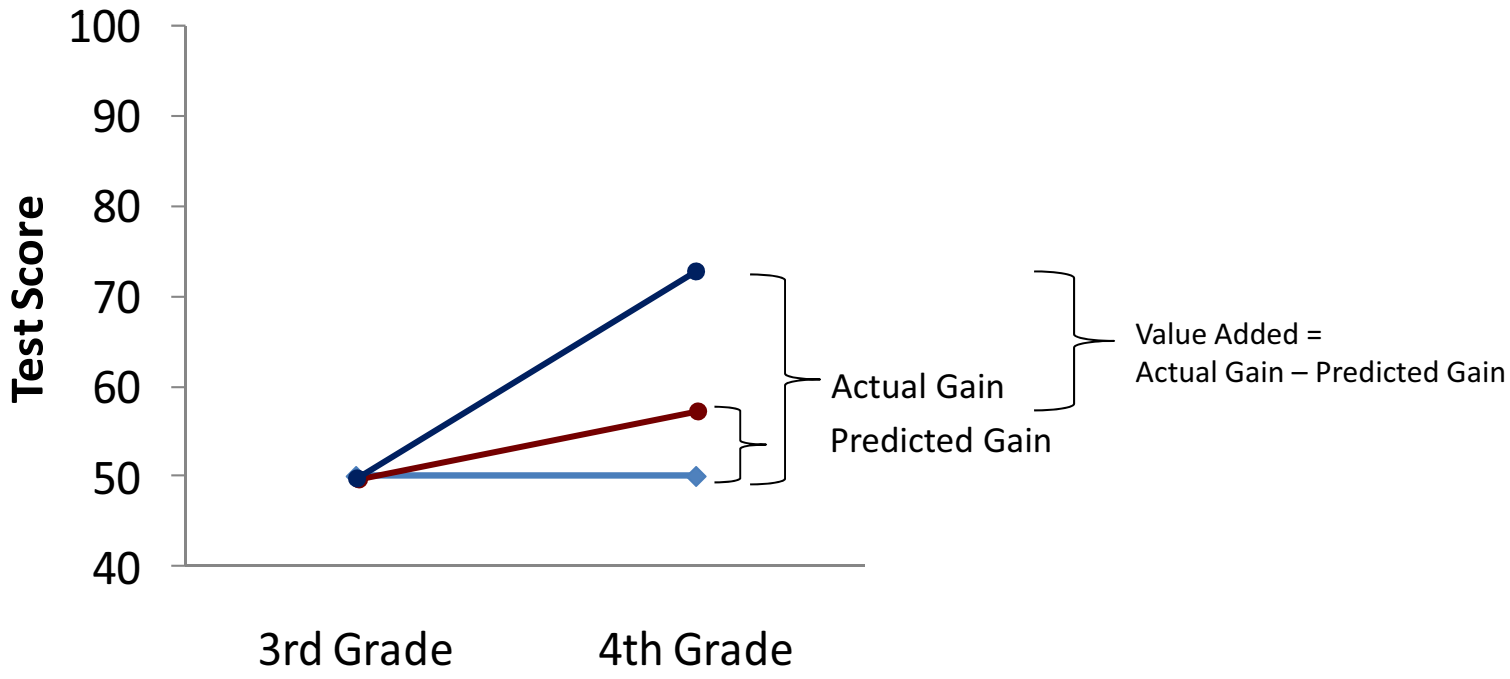
We hope that this work provides district leaders and the community a better understanding of how teachers are currently recruited, placed, and retained by CMS. Further, we hope this work allows CMS to improve the overall effectiveness of the human capital system and ensures that teachers are being matched with students in the most effective manner.

A Model for Examining the Human Capital System



What Is Value-Added?

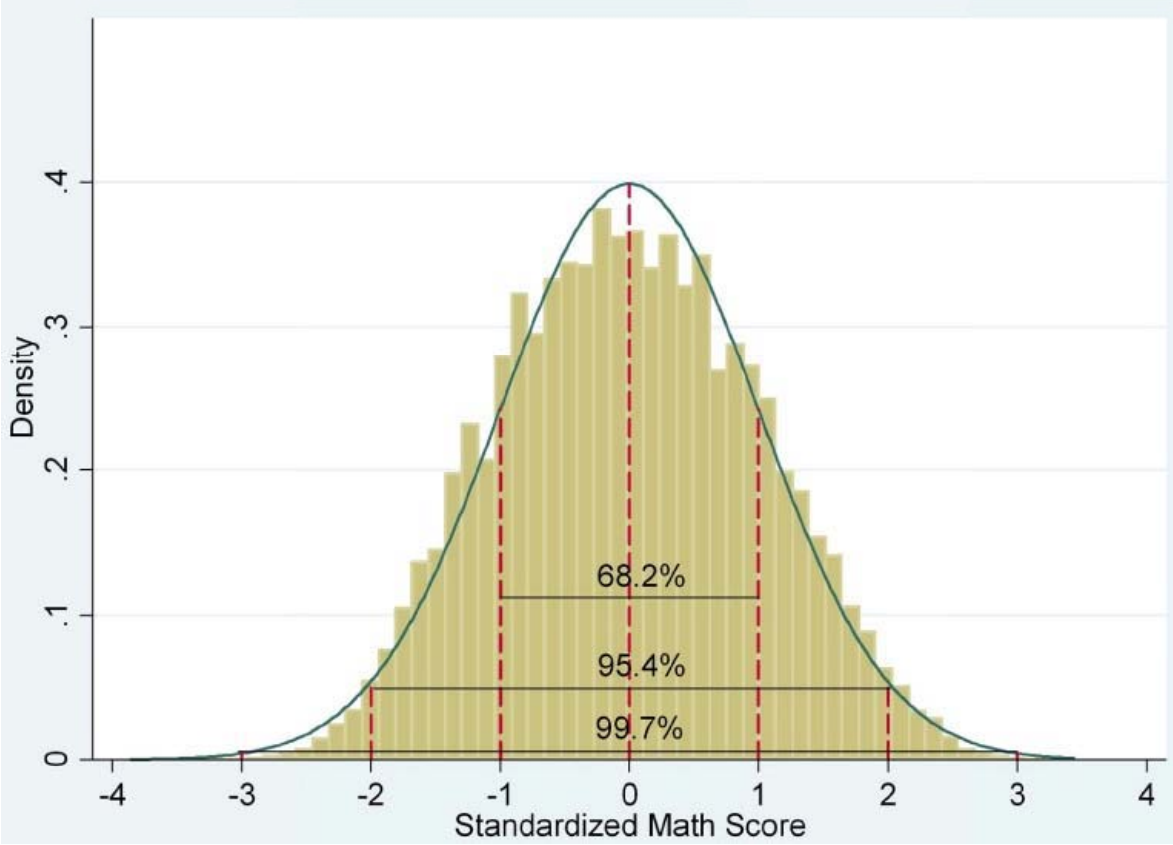
- Value-added models estimate a predicted test score for students, and then attribute variation from the predicted score to the teacher
- Unless otherwise noted, the model we use controls for prior test scores, student characteristics, and peer characteristics; it also compares across schools



‖*CONCEPTUAL*‖

What Is a Standard Deviation?

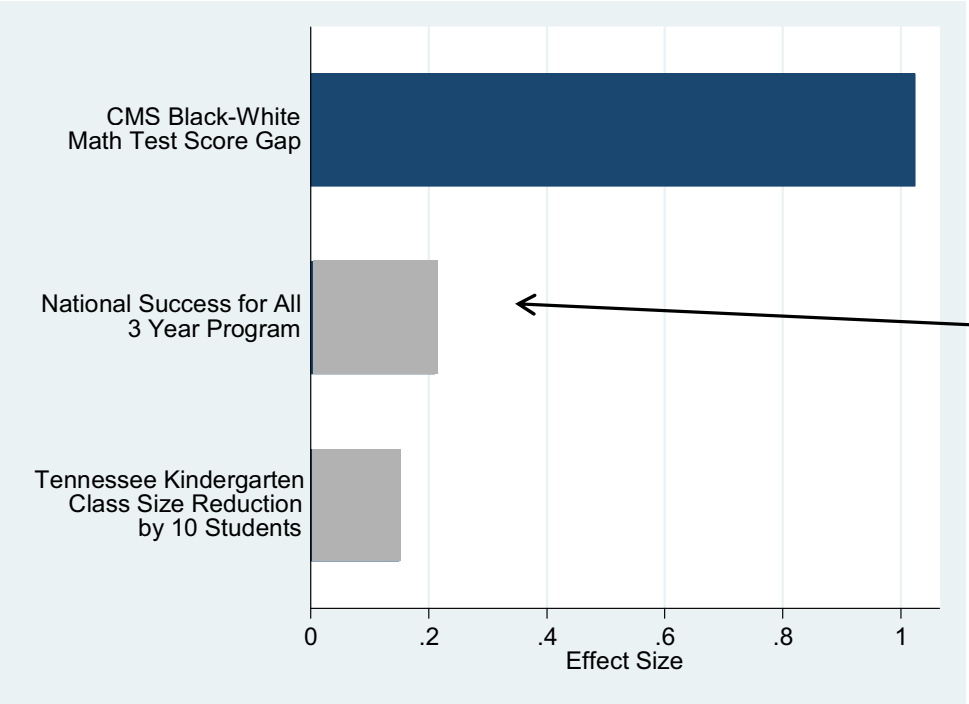
A standard deviation is a measure of spread from the mean. In normally distributed data, 68% of observations are within 1 standard deviation of the mean.



Math scores standardized by year and grade from 1998-99 to 2007-08, grades 3-8

What Is an Effect Size?

- Researchers often convert the impact of interventions into standard deviation units to allow for comparison across interventions – these are called "effect sizes"



For example, the national program Success for All has an effect size of .21. This impact is equivalent to moving a student from the 50th percentile in performance to the 58th percentile.

CMS Black-White test score gap is 1.024 standard deviations in math and .895 standard deviations in reading, using 3rd-8th grade test scores from 1998-99 to 2008-09. The effect of Success for All after three years in the program is .21 sd's on reading comprehension (Borman, et al., 2007). A class size reduction in kindergarten results in .15 sd increase in math scores and a .18 sd increase in reading scores (Finn, 1998, U.S. Department of Education).

Critical Limitations

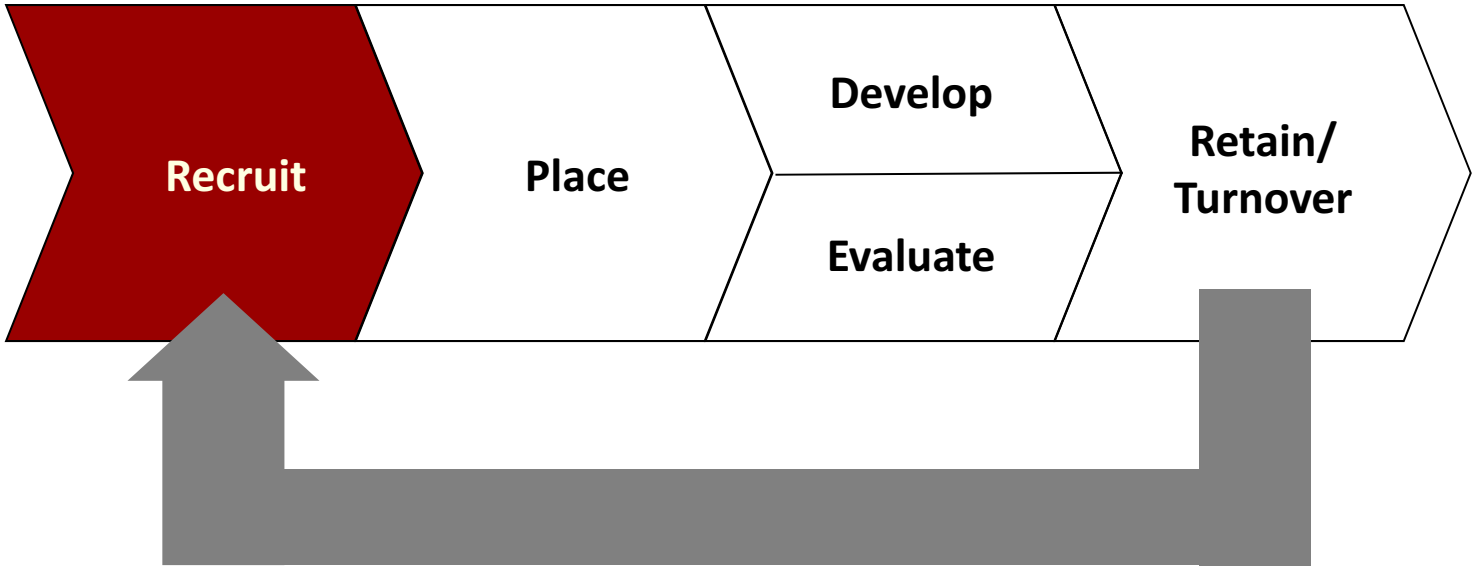
- Outcomes examined are largely limited to math and reading end-of-grade test results in grades 4-8
  - *Not* the only outcomes CMS values
    - Effectiveness in other grades and subjects
    - Other definitions of effectiveness reasonable *within* these grades and subjects
    - Effectiveness with parents, as member of school community, etc. not examined
- Focused only on teachers with student rosters assigned in the student information system
  - For example – no reading specialists, math coaches
- Reading effects were generally less pronounced across analyses than math effects – so math primary focus of report

Additional Caveats

- Diagnostic only
- Effect sizes not always comparable
- Effects discussed focus on average only

- Highlight useful findings using existing data
- Not making causal claims
- Not proposing specific solutions
- Assumes underlying outcome measures are similar (e.g., more like Fahrenheit and Celsius than height and math ability)
- Groups will often have more variation within them than between them
- Example: while novice teachers tend to perform less well than more experienced teachers, some novice teachers outperform their more experienced colleagues

Recruitment



Which Schools Have the Most New Hires?

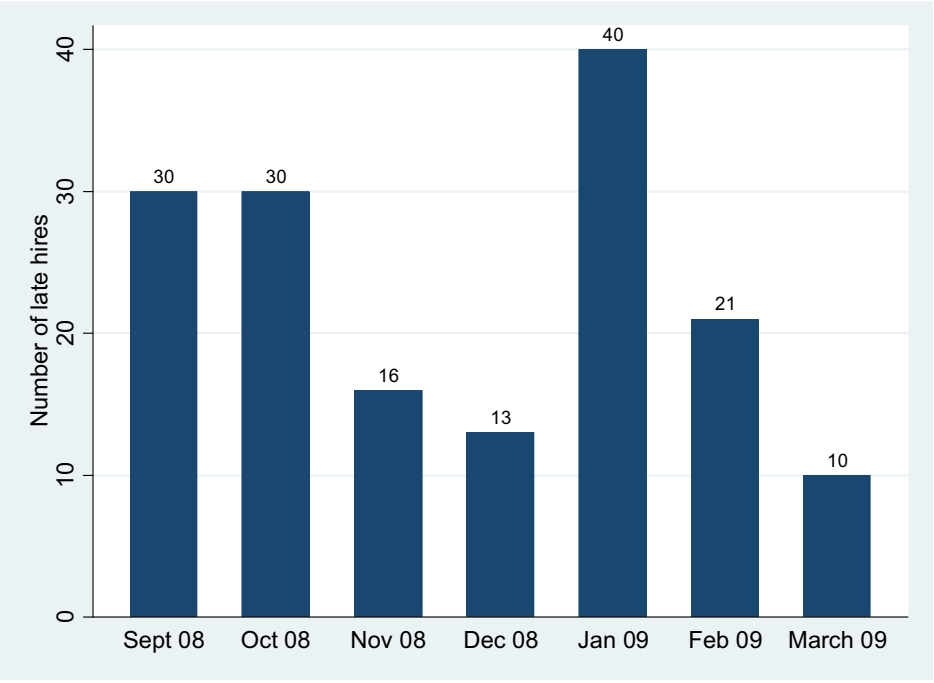
- 12.5% of teacher positions with assigned students were filled by new hires in 2008-09
  - Hiring is down from 18% in 2006-07
  - Newly hired teachers were evenly split between teachers with experience in other districts and novices
- In 2008-09, schools in the Achievement Zone (17% new hires) had the greatest percentages of their teachers as new hires (compare to ELC and NLC at 11% new hires)
- There are greater percentages of new hires in high-poverty schools and schools that did not make AYP or were rated Low Performing on the ABC's

- Stability of staff appears to be an issue in the highest-need schools
  - Unclear if school conditions cause high turnover or high turnover causes school conditions…or both

Some CMS Teachers Are Hired Late

- In 2008-2009, 16% of newly hired teachers have a hire date after the school year begins
  - This is down from between 20% and 25% in the years 1998-99 to 2007-08
- In 2008-09, the Achievement Zone, Central LC, and South LC hired 20% of their new hires late
  - In 2006-07, schools in the AZ hired 35% of their newly hired teachers late
- Late hires are more likely to be novices than experienced teachers
- Late hiring spikes in January

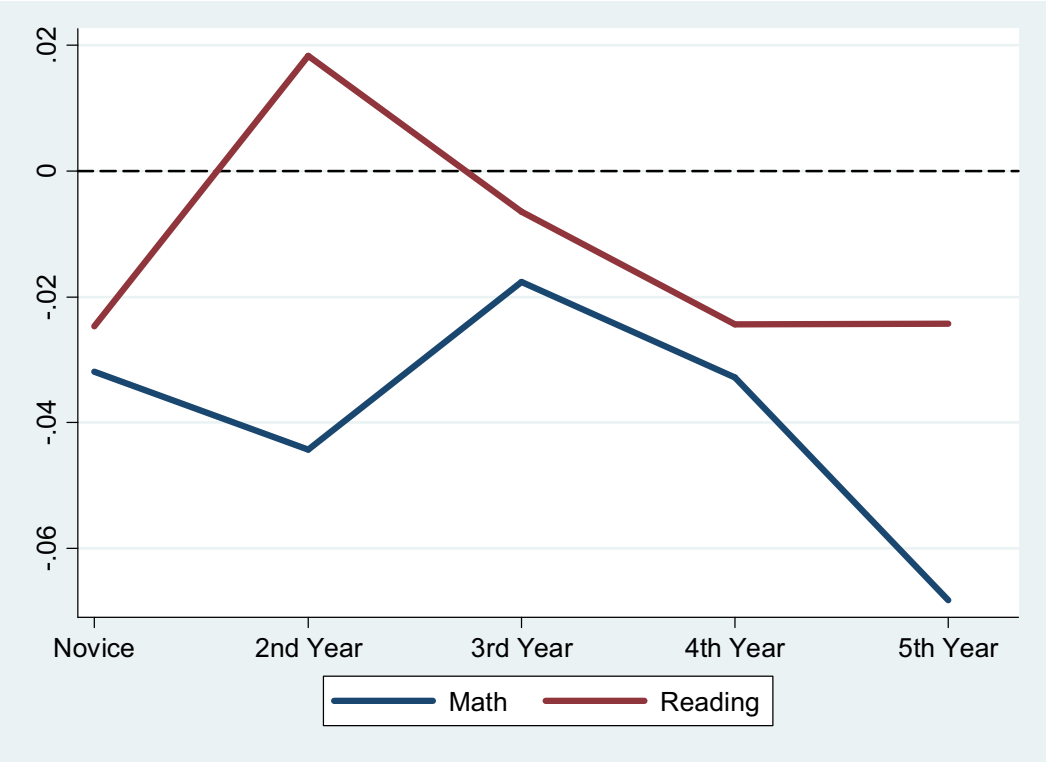
Number of Late Hires in 2008-09
by Month Hired



Note: All classroom teachers with assigned students

Late Hires Perform Less Well On Average

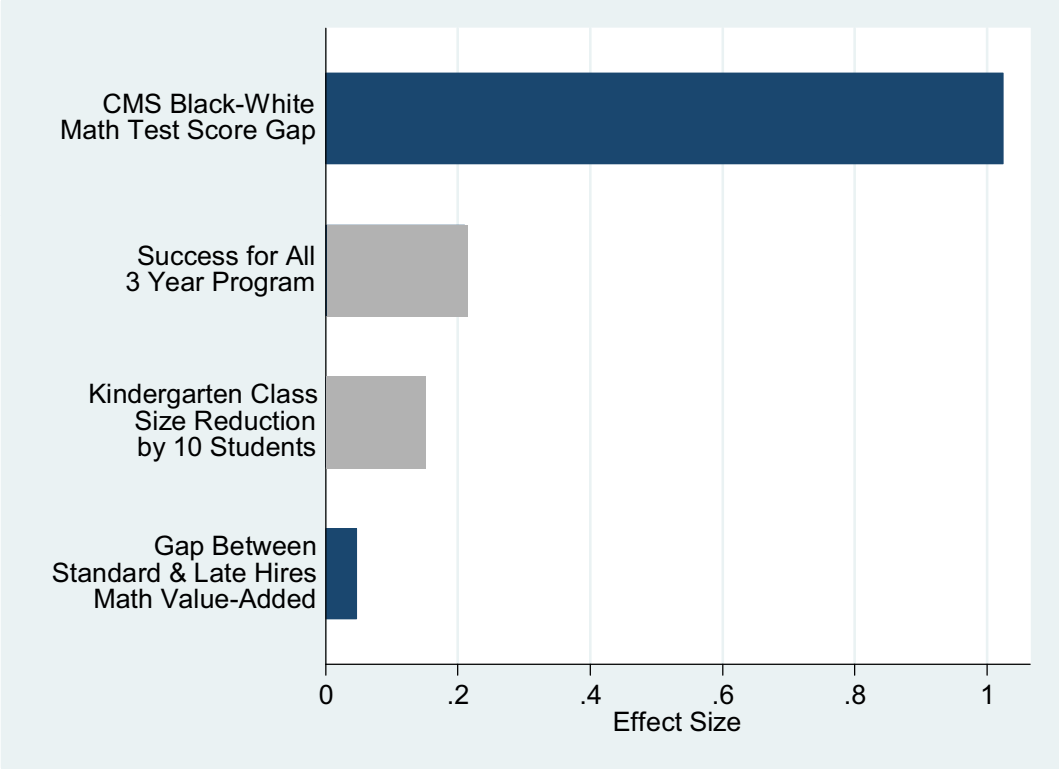
1-Year Value-Added of Late Hires
Compared to Teachers Hired Before the School Year Begins
by Years of Teacher Experience



- Late hires perform less well than those hired before the school year starts
- Trend persists for years after initial hiring

Note: 4th-8th grade math and reading teachers in 1998-99 to 2008-09

The Effect Size of the Late Hires is Moderate

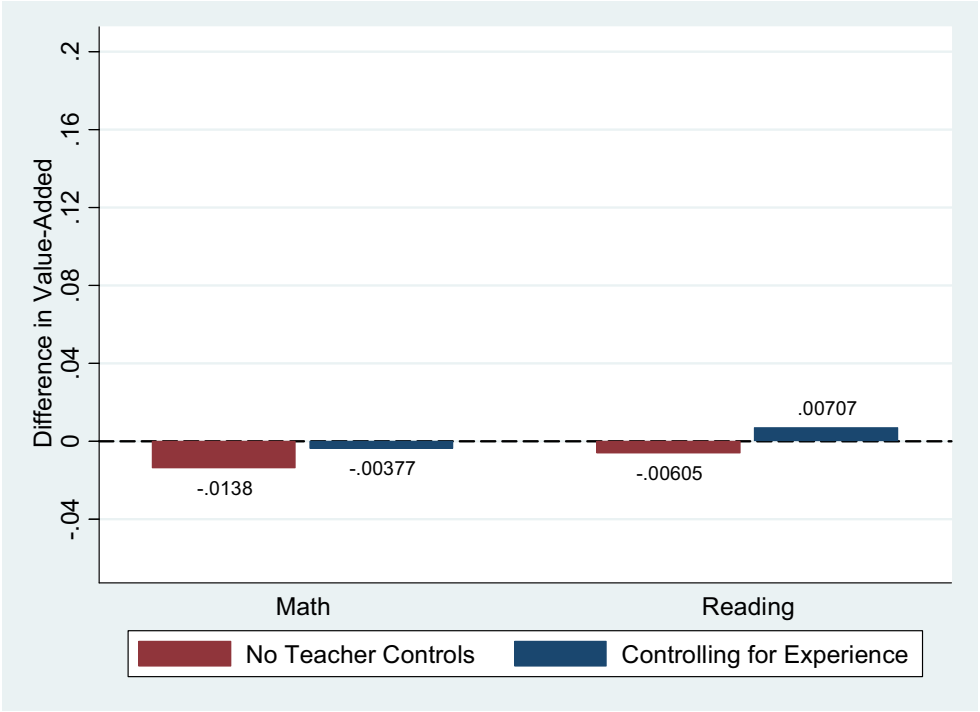


- The late hire performance gap is about a third of the magnitude of a 10 student kindergarten class size reduction

Teacher Certification Pathway May Not Matter

- About a third to a quarter of new hires in recent years have alternative certification (increase from 7% in 1998-99)
- There are no significant differences in value-added between alternatively and regularly certified teachers

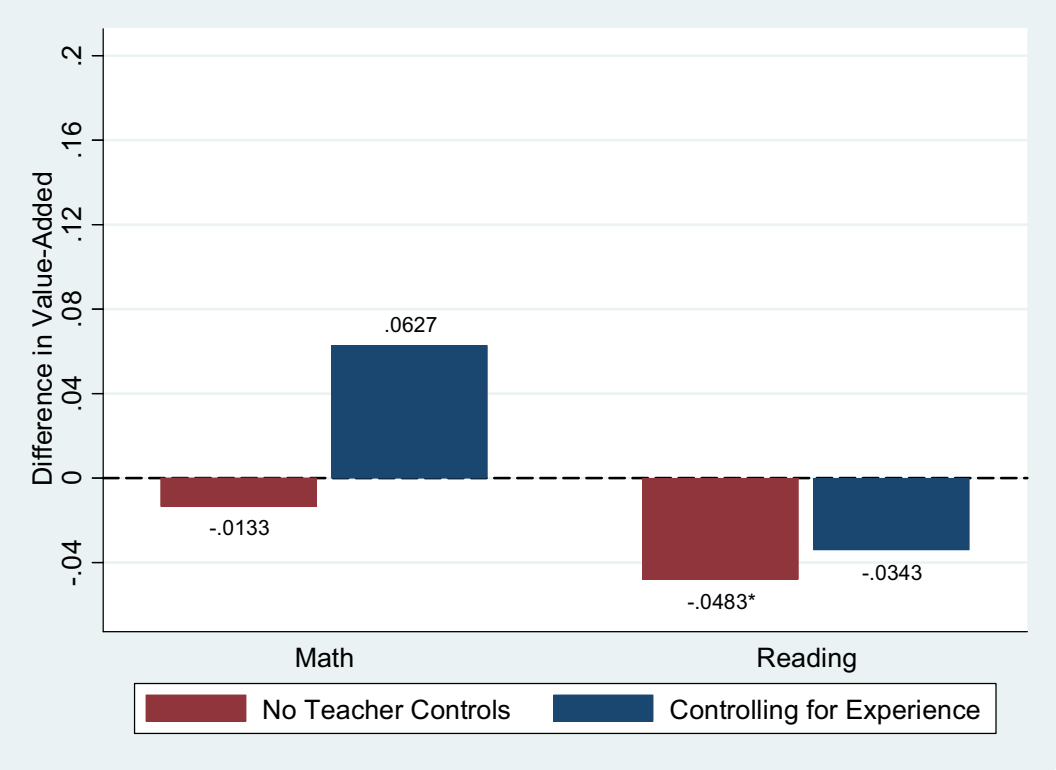
Value-Added of
Teachers with Alternative Certification
Relative to Teachers with Regular Certification



Note: 4th-8th grade math and reading teachers, 1998-99 to 2008-09
*p<.05, **p<.01, ***p<.001

TFA Teacher Effectiveness Not Significantly Different from Others in Examined Grades

Value-Added of Teachers from Teach for America Relative to All Other Teachers

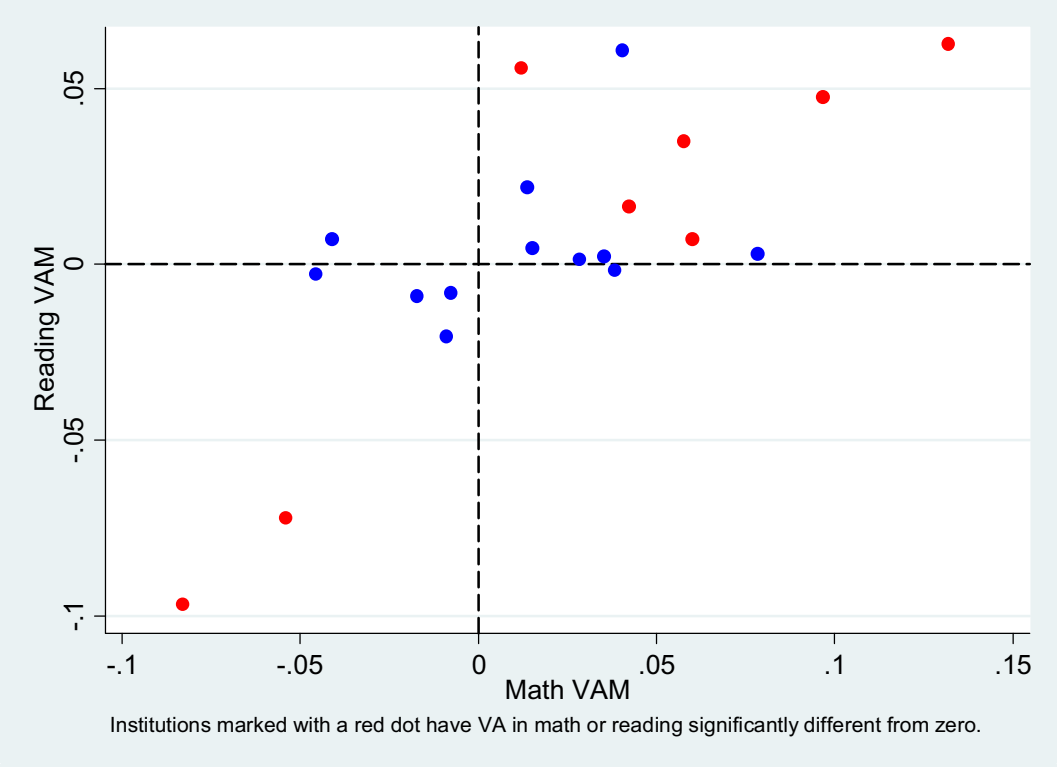


Note: 4th-8th grade math and reading teachers, 2007-08 to 2008-09
*p<.05, **p<.01, ***p<.001

- Once we control for teacher experience, there are no significant differences between TFA teachers and others
- Could be due to
  - No effect
  - Relatively small number of teachers in sample (only 22% of TFA teachers contribute to this analysis)
  - Small number of years of data

Teacher Effectiveness Varies Widely By Teachers' Undergraduate Institution

Value-Added of Teachers by Undergraduate Institution
First 5 Years of Teaching

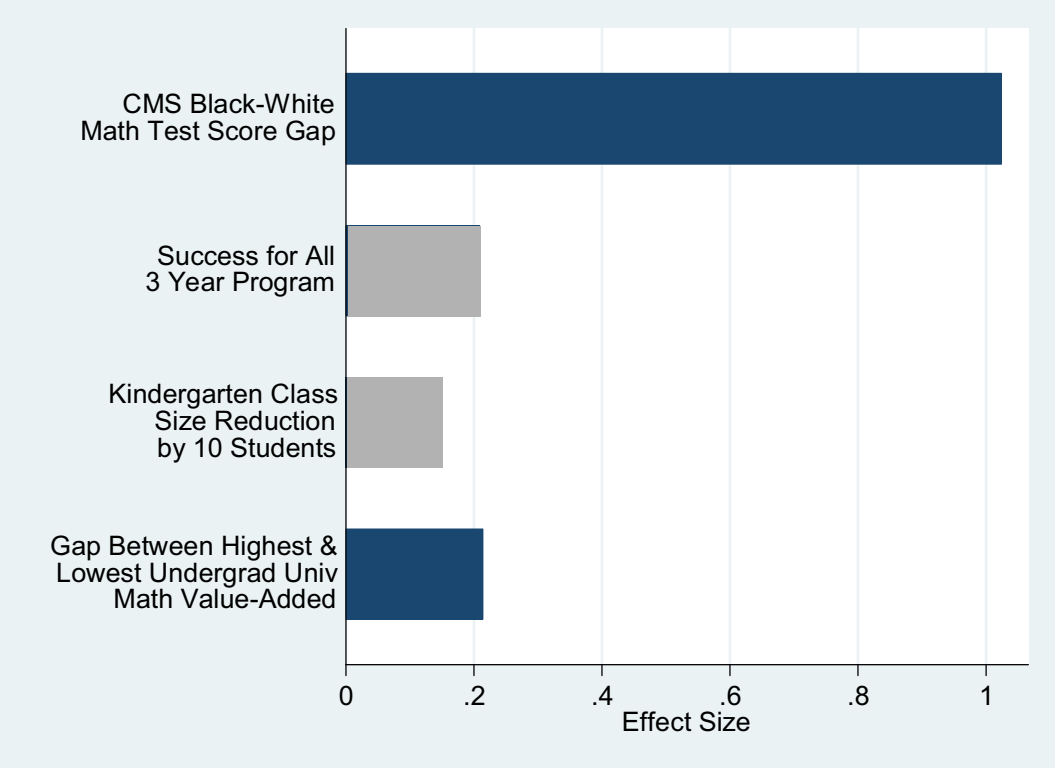


Caveats and Considerations

- Value-added differences may be due to program or selection
- Differences could also be result of who CMS recruits from program pool, not program itself
- Programs may not have ability to expand at same level of quality

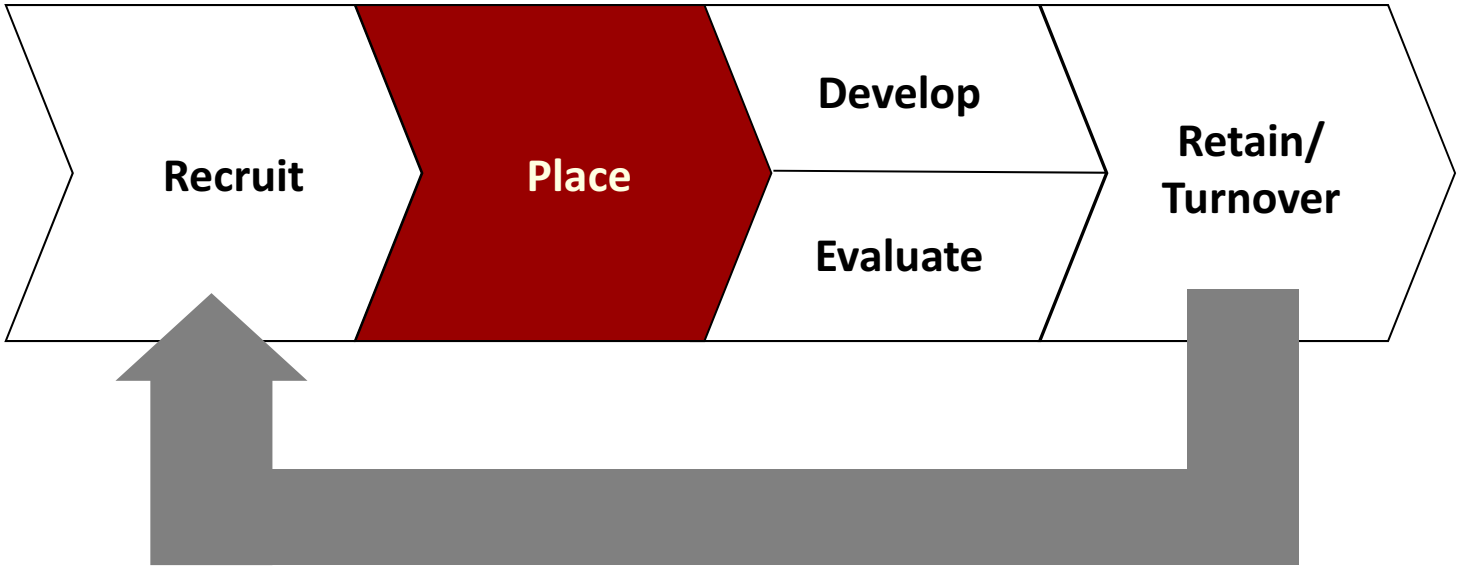
Notes: 4th-8th grade math and reading teachers with five or fewer years of experience between 1998-99 to 2008-09

The Effect Size of the Gap Between Teachers Coming Out of Different Undergraduate Programs Is Large



- This gap is slightly larger than the size of the three-year Success for All intervention

Placement & Distribution



Teachers are Distributed Unequally Across the District

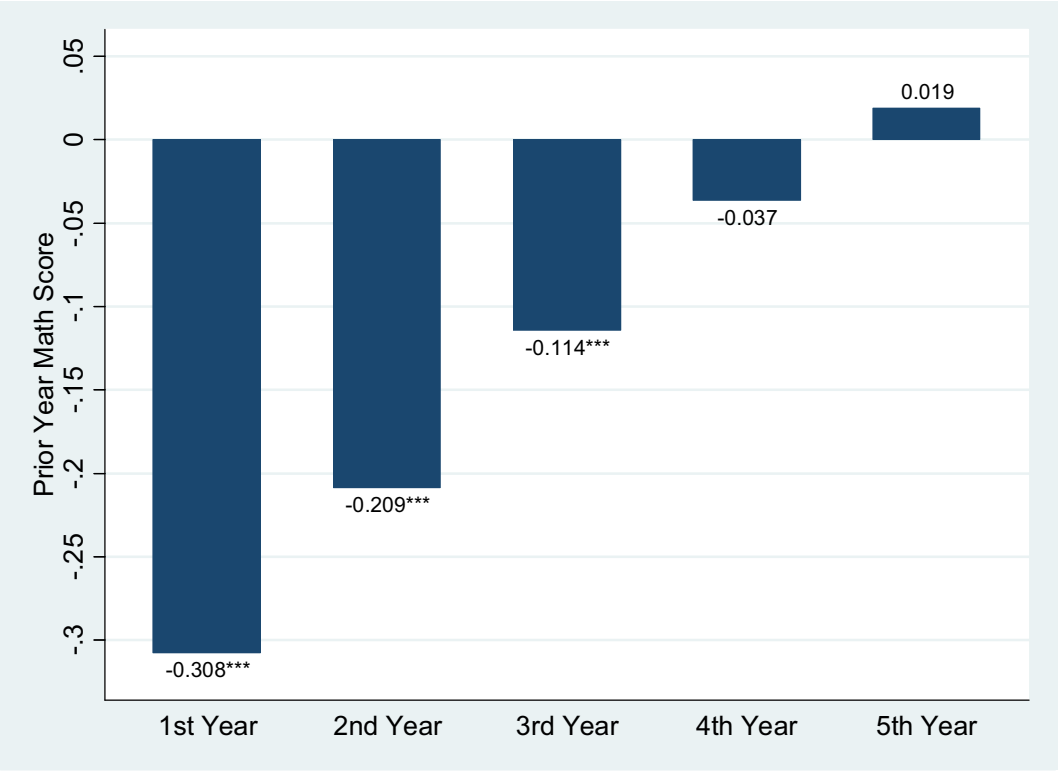
Schools with a high percentage of economically disadvantaged students (EDS) have teachers with less experience and fewer credentials

	High % EDS Schools	Low % EDS Schools	Difference
Salary Step (Yrs. Experience)	8.7	10.8	-2.1***
National Board Certification	5.2%	13.6%	-8.4**
Tenure	42.2%	57.5%	-10.3%***
Novice Teacher	10.7%	6.6%	4.1%***
Late Hire (after September 1)	18.6%	14.6%	-4.0%**
Alternative Certification	21.8%	12.9%	8.9%***
Attended “Competitive” College	30.3%	41.6%	-11.6%***

*p<.05, **p<.01, ***p<.001
Main subject teachers with assigned students, all grades, 2004-05 to 2007-08
High and low % economically disadvantaged designations from the North Carolina Department of Public Instruction

New Teachers Are Placed with Students Who Are Academically Behind Those of More Experienced Teachers

Prior Math Performance of Students Assigned to Teachers with Five or Fewer Years of Experience Across CMS

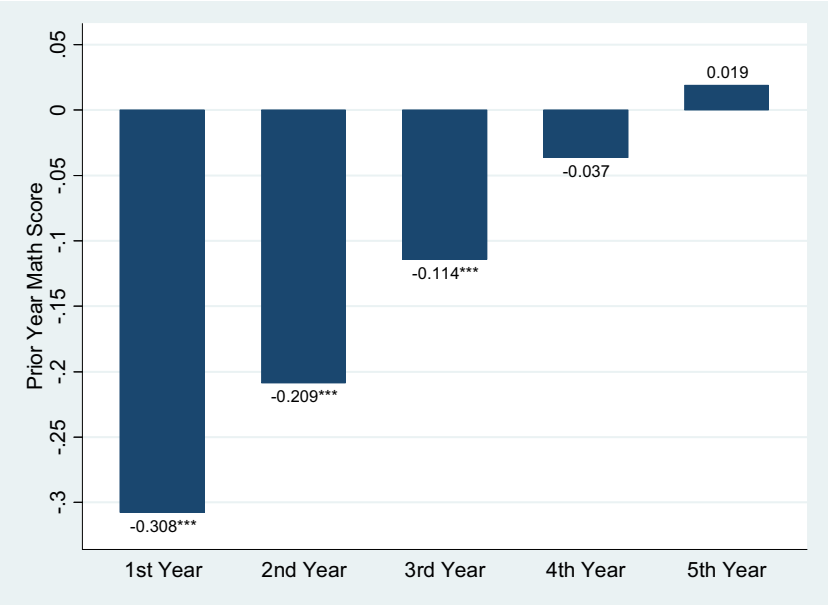


- 1st, 2nd, and 3rd year teachers have students with significantly lower prior math performance than teachers with 6 or more years of teaching experience

*p<.05, **p<.01, ***p<.001
Note: Baseline math scores from grades 3-7 in years 2004-05 to 2007-08, students assigned in grades 4-8 in years 2005-06 to 2008-09.

This Occurs Both Across and Within Schools

Prior Math Performance of Students Assigned to Teachers with Five or Fewer Years of Experience Across CMS



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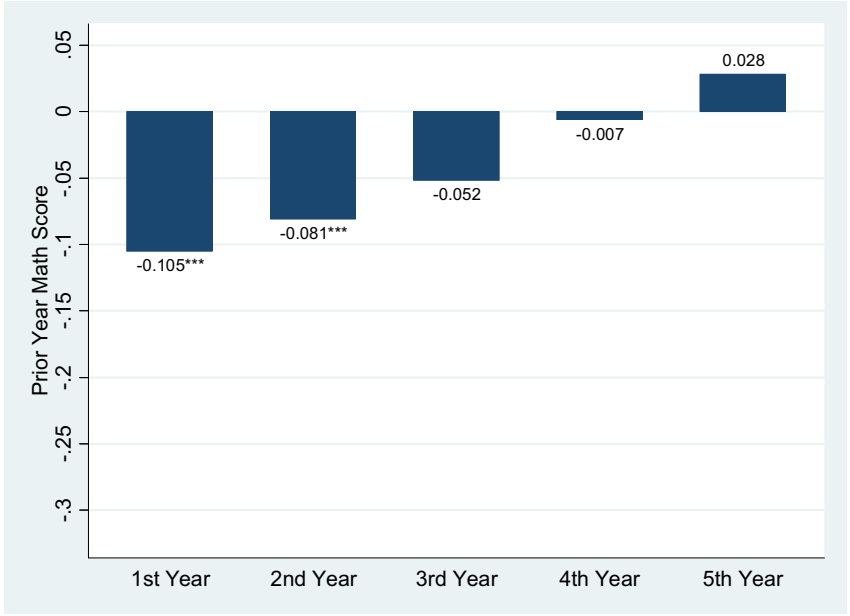
Note: 1st, 2nd, and 3rd year teachers have students with significantly lower prior math performance than teachers with 6 or more years of teaching experience when comparing across the district. Baseline math scores from grades 3-7 in years 2004-05 to 2007-08, students assigned in grades 4-8 in years 2005-06 to 2008-09.

Prior Math Performance of Students Assigned to Teachers with Five or Fewer Years of Experience Within Schools



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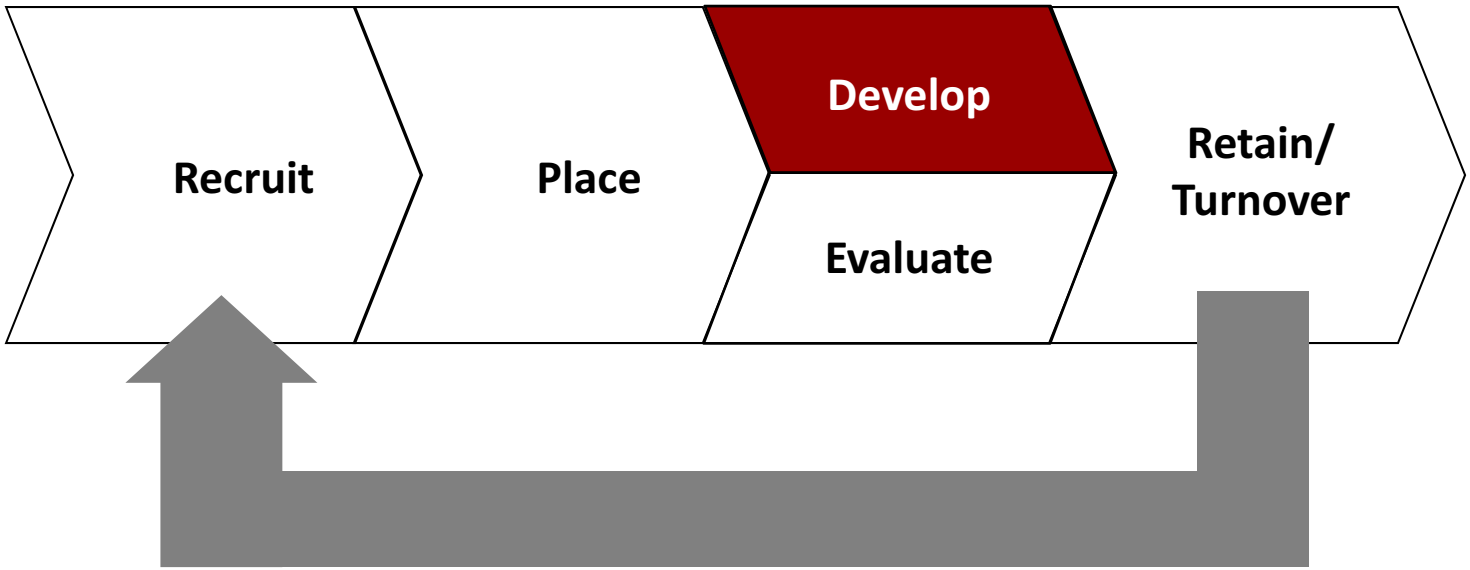
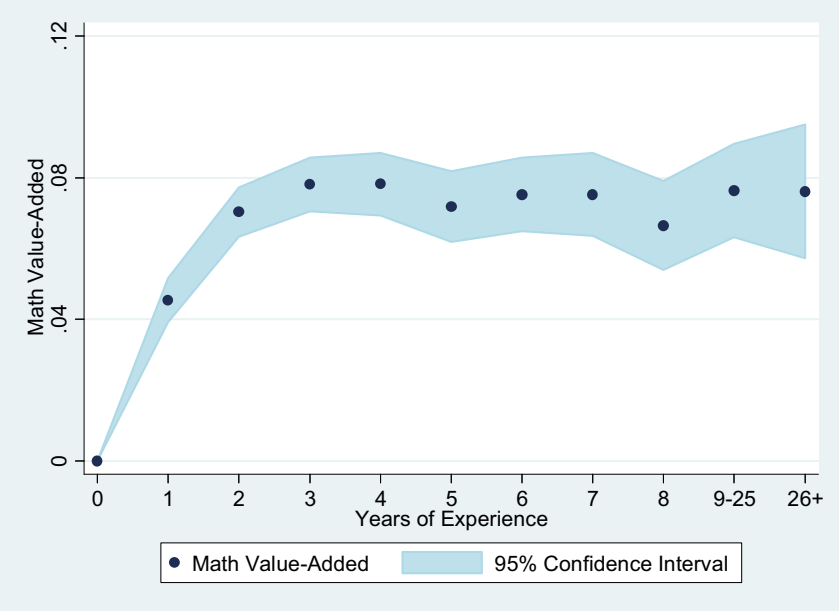
Note: 1st and 2nd year teachers have students with significantly lower prior math performance than teachers with 6 or more years of teaching experience when comparing within schools. Baseline math scores from grades 3-7 in years 2004-05 to 2007-08, students assigned in grades 4-8 in years 2005-06 to 2008-09.

Development



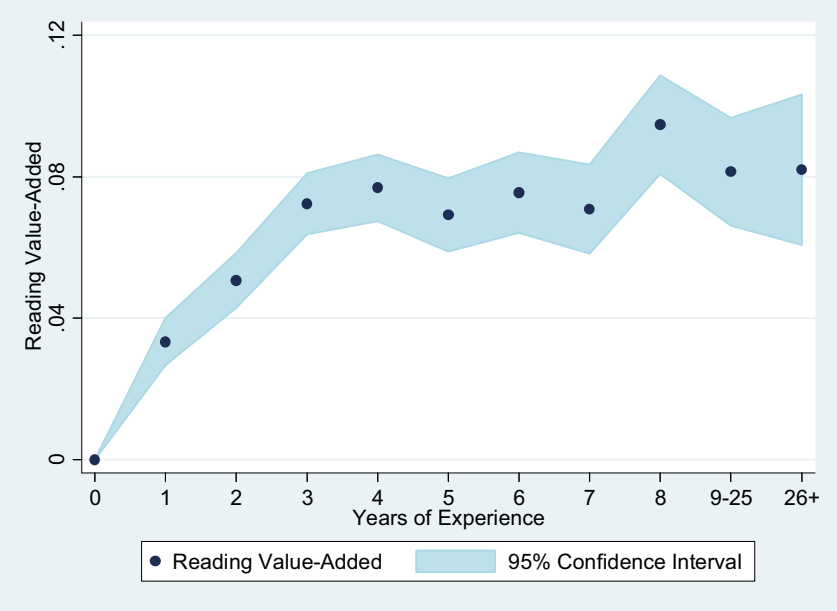
Teachers Improve Rapidly in Early Years – But This Flattens Out After Year 4

Math Value-Added by Teacher Experience, Relative to Novice Value-Added



Note: Estimated using teacher fixed effects.
4th-8th grade math teachers, 1998-99 to 2008-09

Reading Value-Added by Teacher Experience, Relative to Novice Value-Added

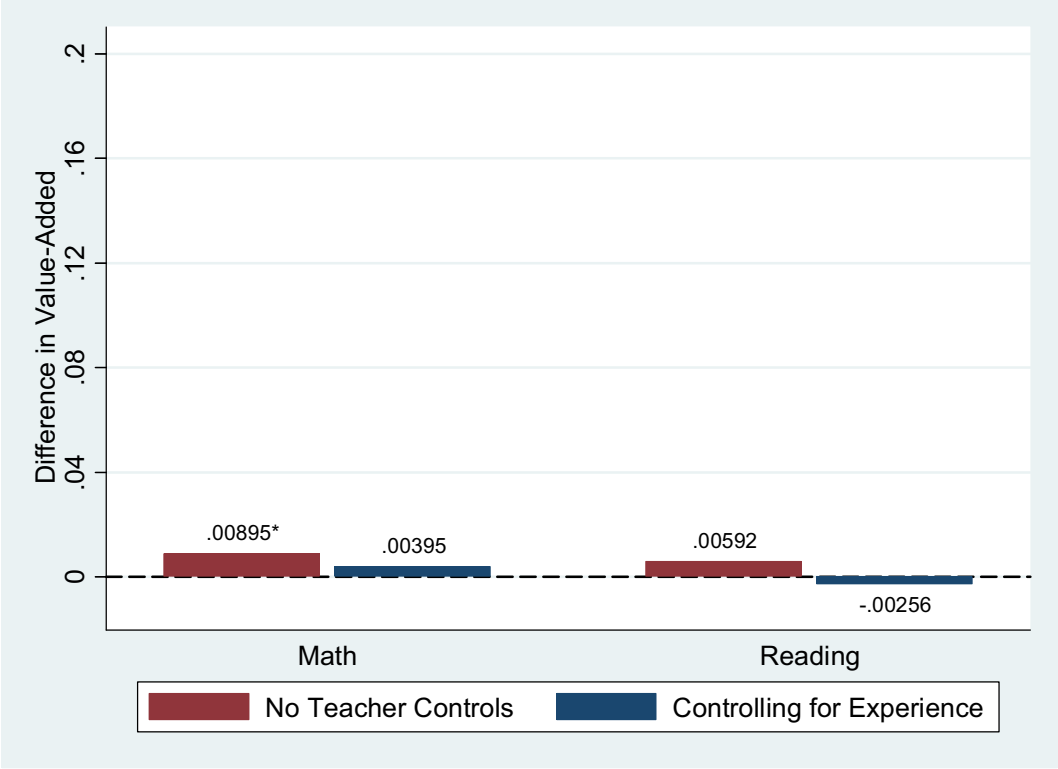


Note: Estimated using teacher fixed effects.
4th-8th grade reading teachers, 1998-99 to 2008-09

Teachers Obtaining Advanced Degrees May Not Matter

- Controlling for years of teacher experience, there is no significant difference between teachers with master's degrees or doctorates and those with only a bachelor's degree

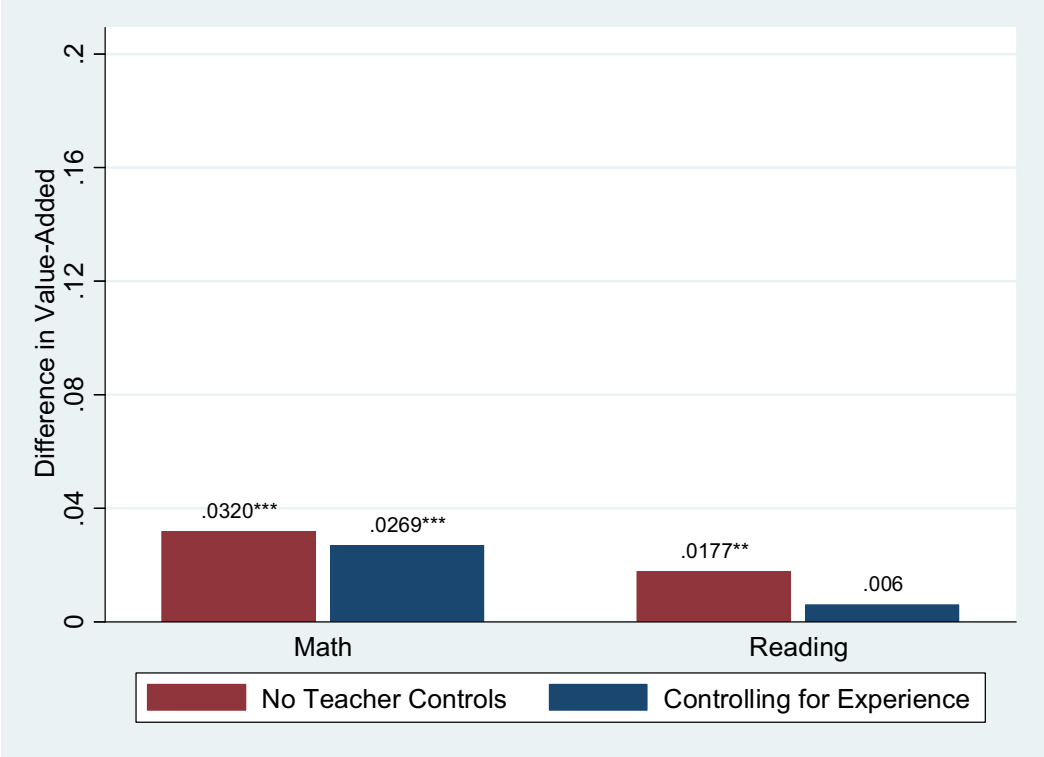
Value-Added of Teachers with an Advanced Degree Relative to Teachers with only a Bachelor's Degree



Note: 4th-8th grade math and reading teachers, 1998-99 to 2008-09
*p<.05, **p<.01, ***p<.001

Some Positive Returns to National Board Certification

Value-Added of Teachers with National Board Certification Relative to All Other Teachers



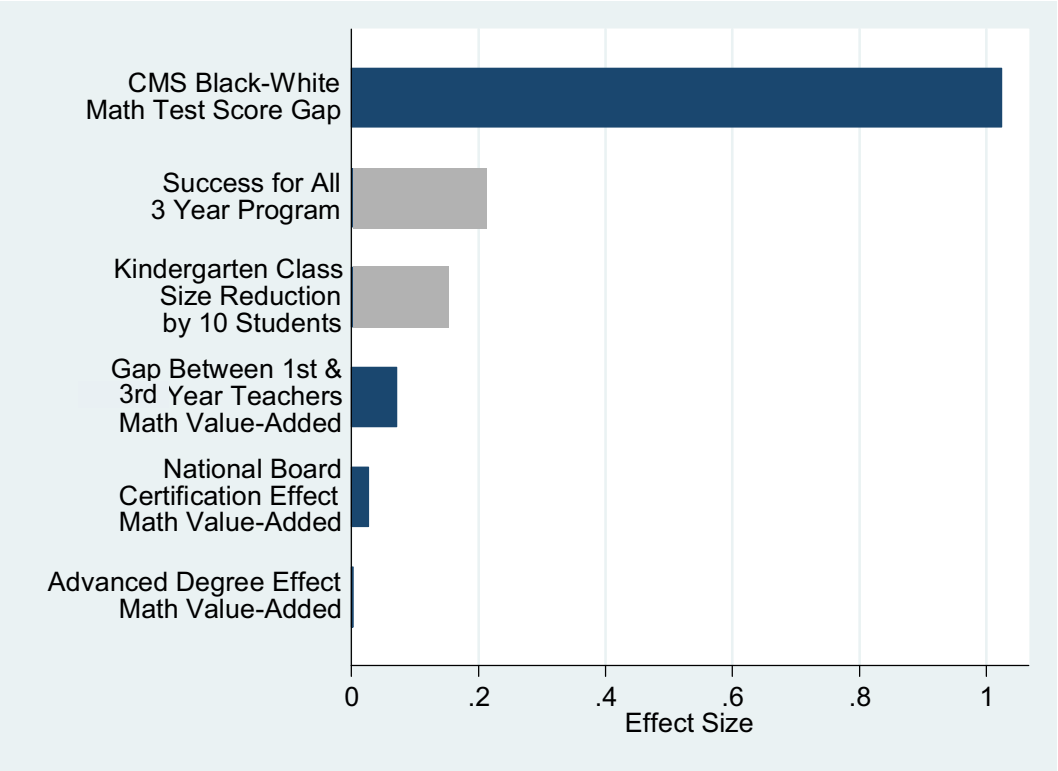
Note: 4th-8th grade math and reading teachers, 1998-99 to 2008-09, NB certification of any type

*p<.05, **p<.01, ***p<.001

Caveats

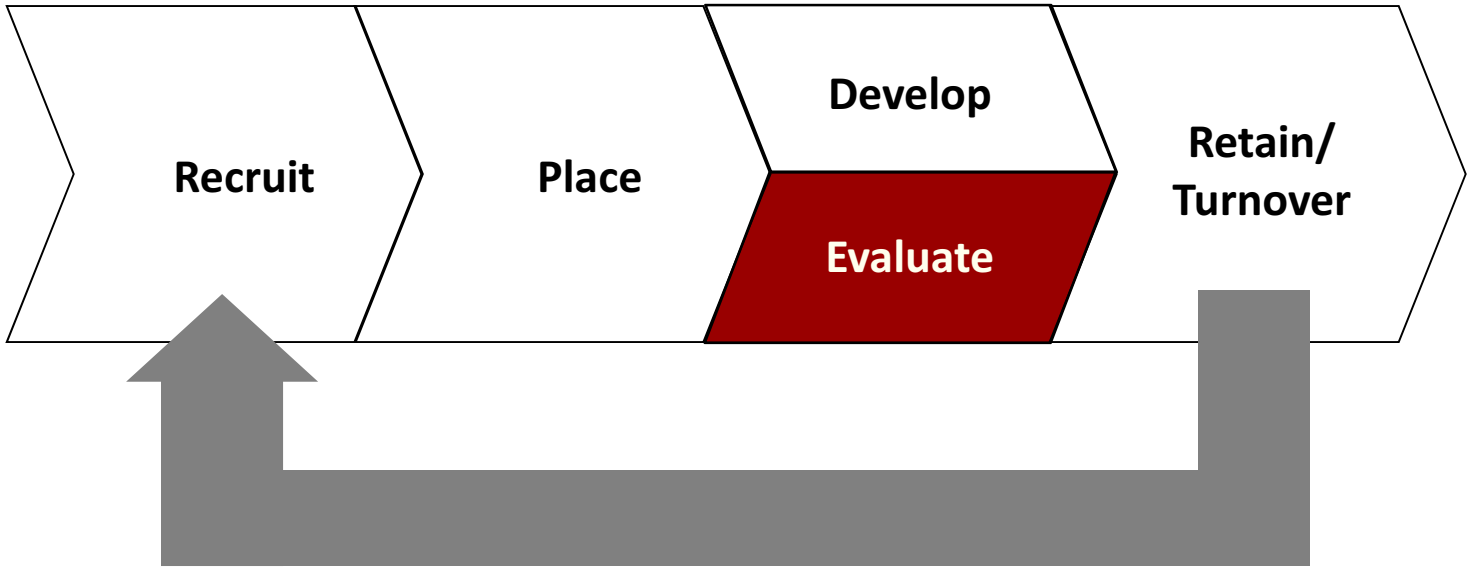
- Examined certification status only – not specific certification obtained by teachers
- May have differential impacts based on subject, grade, and students

The Effect Size of Teacher Experience Is Moderate; The Effect of National Board Certification Is Small



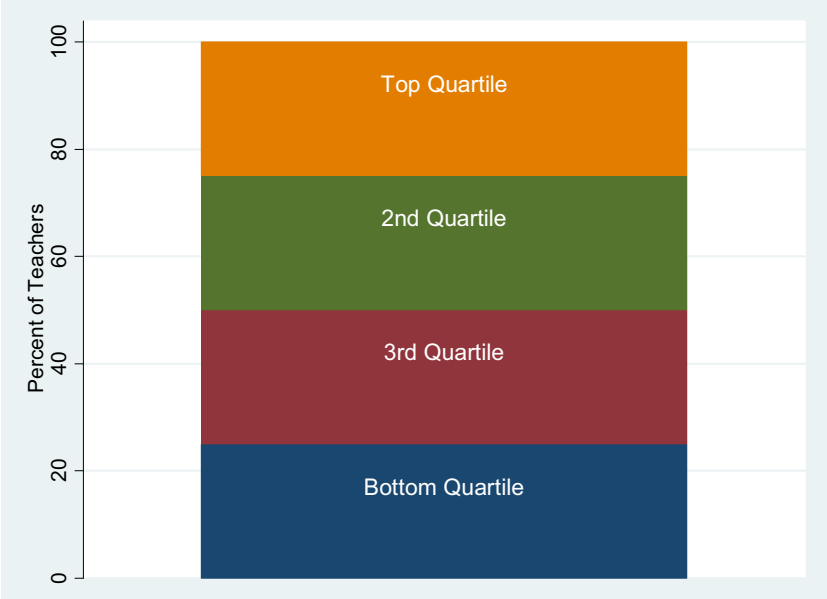
- The gap between first and third year teachers' effectiveness is about half the size of a 10 student kindergarten class size reduction
- Teachers with National Board Certification have an effect about a tenth of the size of the Success for All intervention

Evaluation

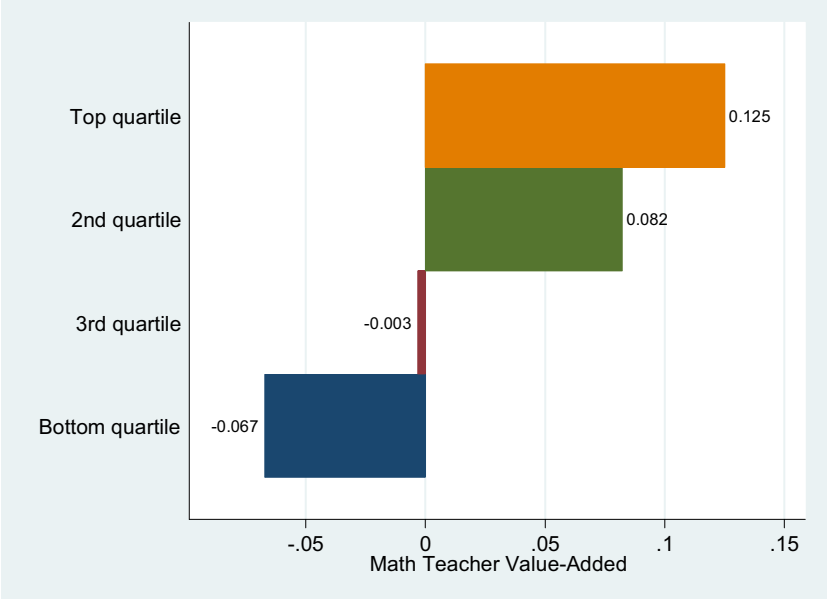


Prior Math Performance Predicts Future Math Performance

Rank Teachers' math value-added in first 2 years



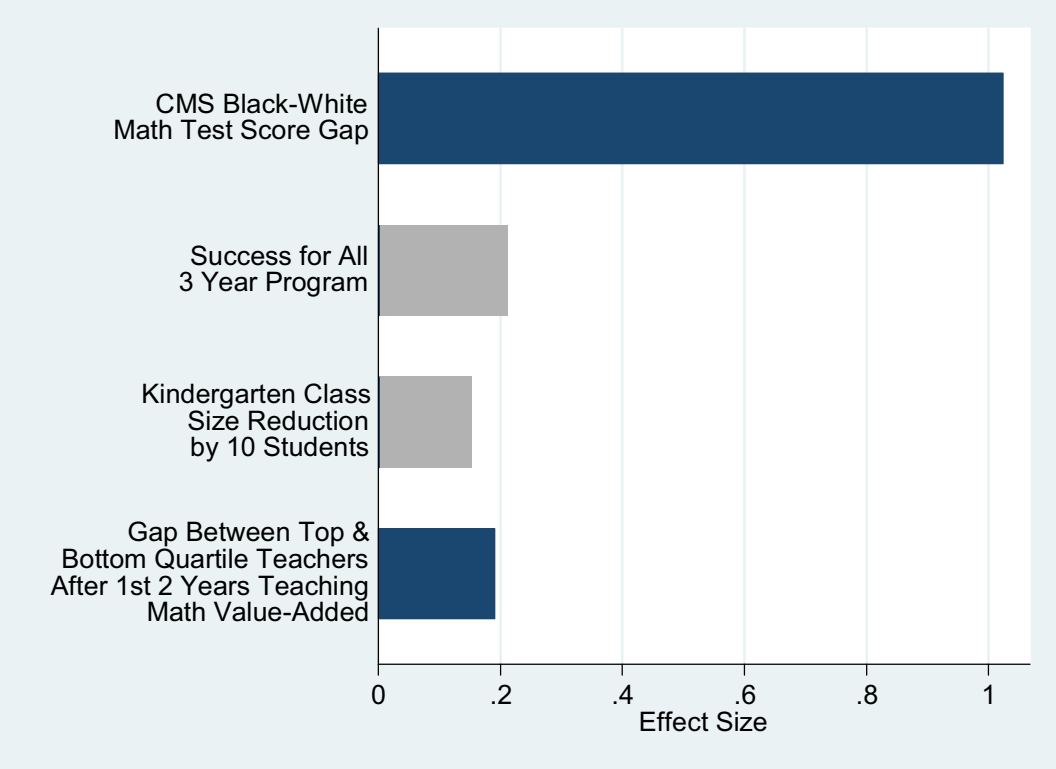
How do they perform in year 3?



Note: 4th-8th grade novice math teachers in 2002-03 to 2006-07 who stay for at least three years (2004-05 to 2008-09)

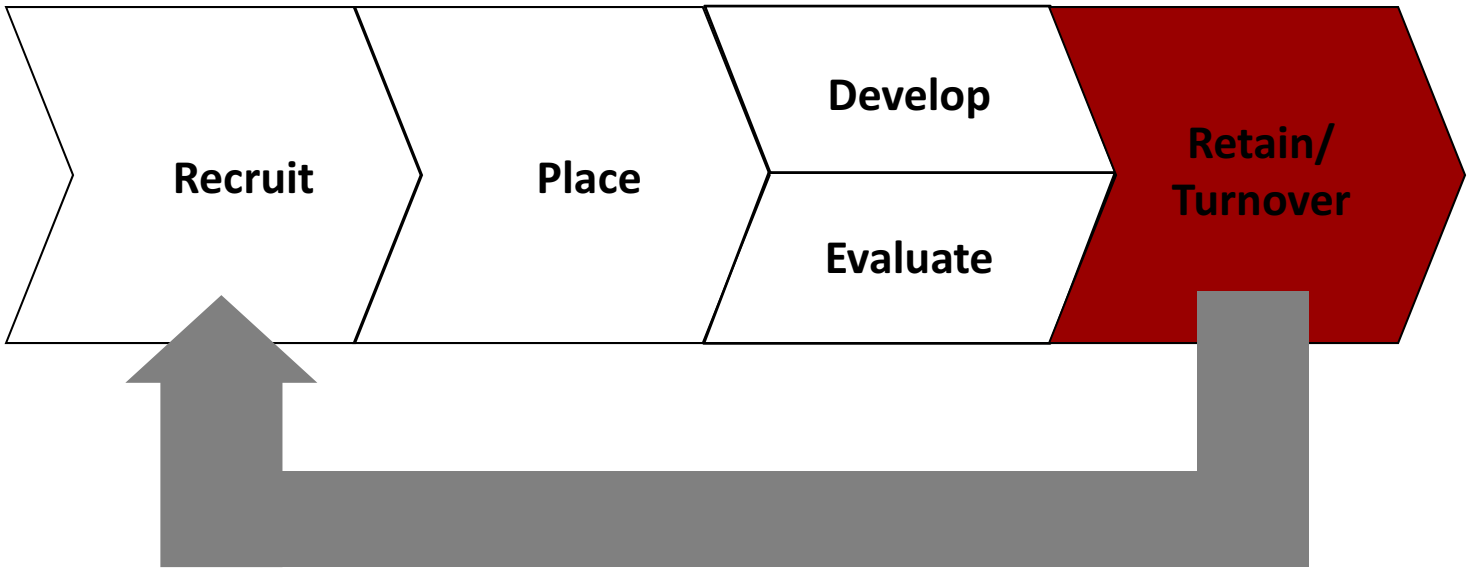
Note: 4th-8th grade novice math teachers in 2002-03 to 2006-07 who stay for at least three years (2004-05 to 2008-09). Correlation between third year and prior performance is .55. The trend is not as strong in reading.

Gap Between Top and Bottom Quartile Teachers after 2 Years Is Large



- The difference in student achievement outcomes between a top and bottom quartile teacher after two years of teaching is about the size of the three-year Success for All intervention and is larger than a 10 student class size reduction

Retention



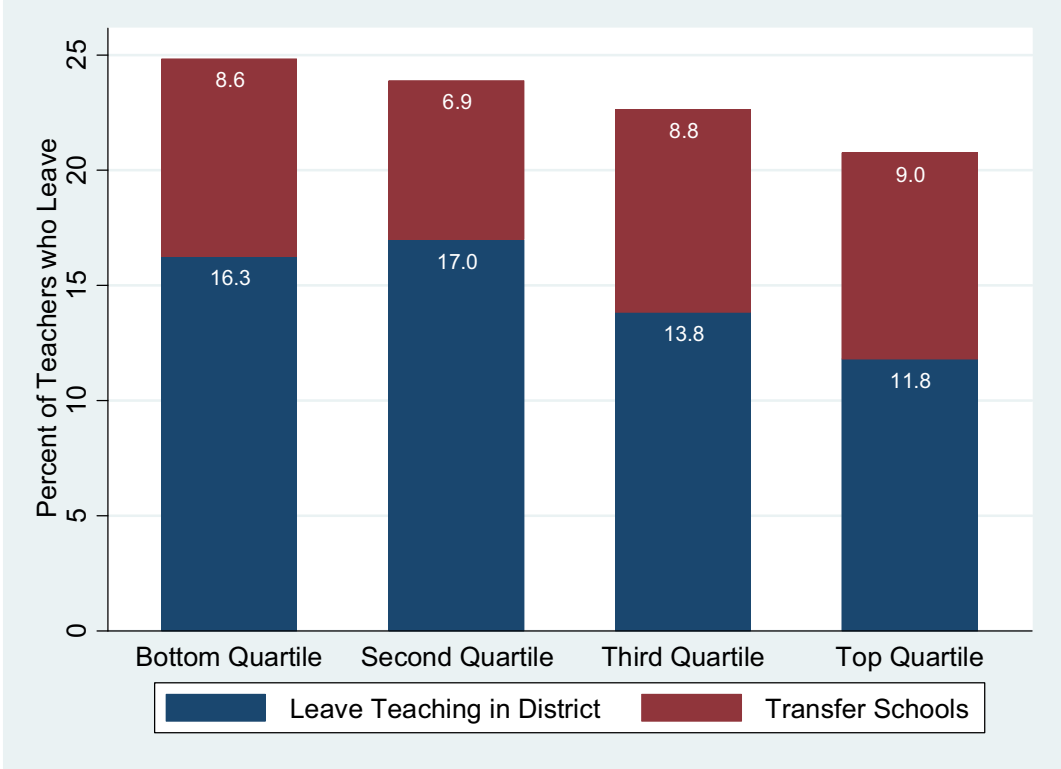
Retention

- In 2006-07, 13% of teachers with assigned students left the district, 5% left classroom teaching in the district but took other district positions, and 7% of teachers transferred schools

- After five years, less than a third of all teachers remain teaching in the same school in CMS
  - 48% left the district
  - 8% left classroom teaching in the district but took other district positions
  - 14% transferred schools
  - 30% stayed in the same school

- In 2006-07, 81.3% of teachers in low-need schools remained in their same school while only 72.4% of teachers in high-need schools remained at their same school

High Value-Added Math Teachers are Less Likely to Leave Teaching in the District



- High value-added math teachers are more likely to stay in teaching in the district
- They are not more or less likely to transfer schools
- This pattern does not hold for reading teachers

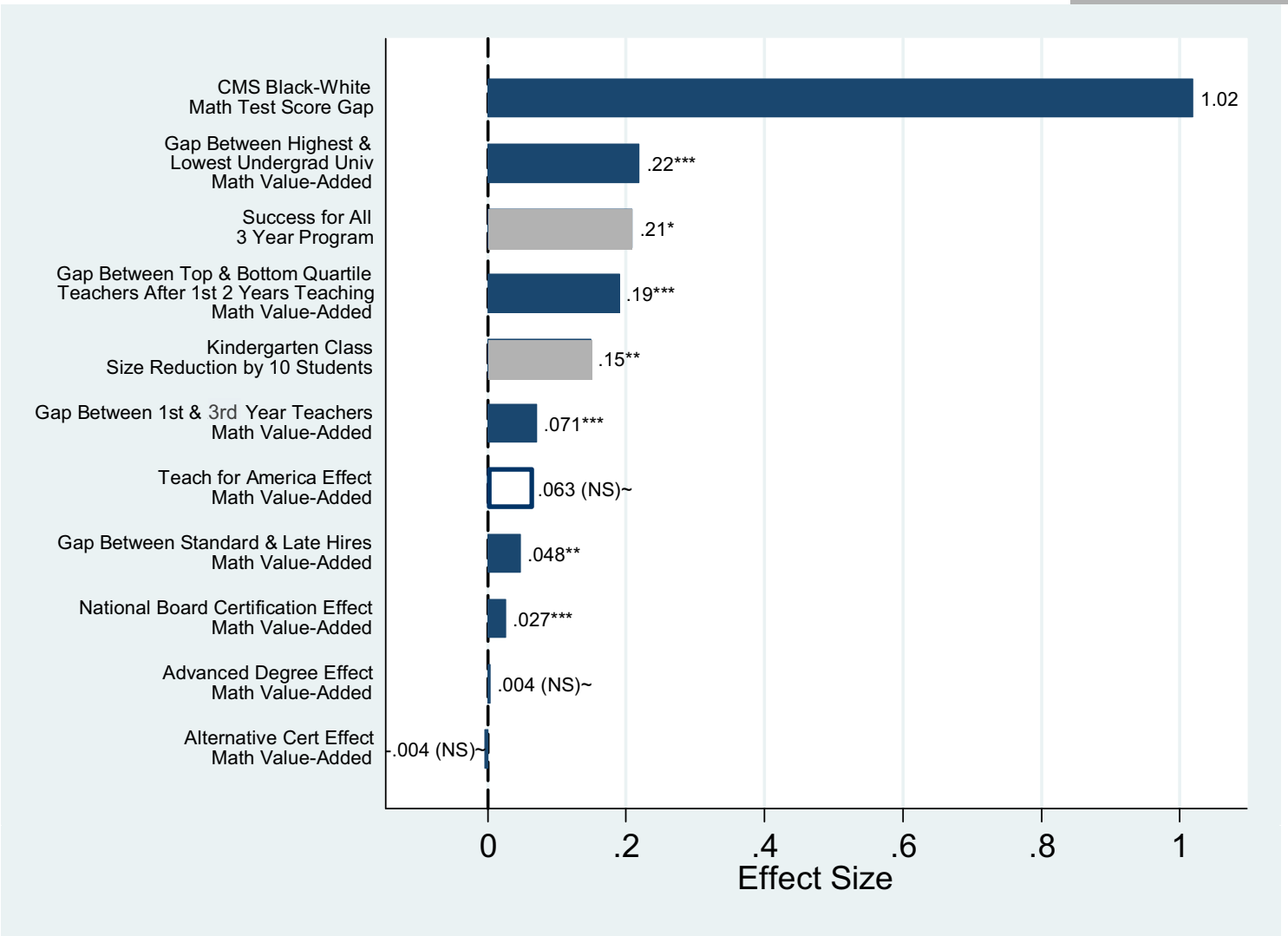
Note: 4th-8th grade math teachers, 2003-04 to 2007-08

Teachers Transfer Within District to Lower-Need Schools

Characteristics of Schools	Transfer From	Transfer To	Difference
% Economically Disadvantaged Students	51.9%	44.4%	-7.5%***
% Students LEP	9.9%	9.6%	0.3%*
% Students Special Education	10.4%	9.4%	-1.0%
% Students African American	48.6%	43.3%	-5.3%
% Students Hispanic	10.5%	10.5%	0.0%
School Math Scores	-0.08	-0.01	.07***
School Reading Scores	-0.08	-0.003	.08***
Average Student Absences	9.44	9.42	-0.02
School Made AYP	25.9%	38.9%	13.0%***

Note: Teacher transfer patterns hold for experienced and inexperienced teachers.
All grade and subject teachers, 2003-04 to 2008-09.
*p<.05, **p<.01, ***p<.001

Conclusion – Comparing Math Effect Sizes



Note: *p<.05, **p<.01, ***p<.001, ~NS Not Significant